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Transmission of Mössbauer rays through ferromagnets in radio-frequency magnetic field

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Abstract

The transmission of Mössbauer radiation through a thick ferromagnetic crystal, exposed to a radio-frequency (rf) magnetic field, is studied. The quantummechanical dynamical scattering theory is developed, taking into account the periodical reversals of the magnetic field at the nuclei. The Mössbauer forward scattering (FS) spectra of the weak ferromagnet FeBO3 placed into rf field are measured. It is found that the coherent gamma wave in the crystal absorbs or emits only couples of the rf photons. As a result, the FS spectra consist of equidistant lines spaced by twice the frequency of the rf field in contrast to the absorption spectra. © Springer Science+Business Media B.V. 2012.

Keywords

Forward scattering spectra, Iron borate, Mössbauer spectroscopy, Radio-frequency magnetic field